C.12

2nd Copy

ANNUAL REPORT

OF THE

SUDAN VETERINARY SERVICE

FOR THE YEAR

1950/51.

REAU OF [illegible] & [illegible]

McCorquodale & Co. (Sudan), Ltd

[illegible]
LIBRARY
+
Ann Rep
V28
.HS86
S94
1950/51

22501562056

ANNUAL REPORT
OF THE
SUDAN VETERINARY SERVICE
FOR THE PERIOD
1st JANUARY 1950 TO 30th JUNE, 1951.

GENERAL.

As a result of a change in the budgetary year this report covers the period 1st January 1950 to 30th June 1951. In future annual reports will cover the period 1st July to 30th June.

The most notable event of the period was the successful immunisation of very large numbers of cattle against cattle plague by goat virus vaccine. The implementation of the various campaigns necessitated careful planning and many difficulties had to be overcome but it is anticipated that in the near future it will be possible to apply this method of immunisation to most parts of the country.

A private company, Sudan Meat Products Ltd., was granted a license for the mechanical processing of meat and other animal products at Kosti in the Blue Nile Province. The capital is to be provided in the first instance by Liebigs Extract of Meat Co., Ltd., but as soon as the factory is ready to go into production, Sudan Meat Products Ltd., will invite Sudanese participation up to 30 per cent. Good progress has been made during the period under review with the various aspects of this important project. The construction of the factory, which is designed to cope with an eventual maximum intake of 100,000 cattle per annum, and the company's staff housing are well advanced, though there has been delay in the delivery of certain machinery. Cattle routes from the west to the factory have been selected and arrangements made for the provision of water supplies along the routes. It is anticipated that the factory will begin to operate on a small scale early in 1952.

Notable visitors included Professor A. Mozley, a malacollogist, who visited the White Nile Area in connection with the liver fluke problem and Professor J. H. Bisschop, the eminent South African livestock specialist who arrived early in 1951 to report upon the livestock of the country and to advise upon animal industry matters.

For the first time in the history of the department certain unclassified staff, members of the recently formed veterinary workers trade union, went on strike on a number of occasions. These strikes occurred in sympathy with workers of other trade unions and the majority of the veterinary workers had little or no idea of the reasons of the strikes.

SECTION I.

STAFF.

Though vacancies continued to exist in all sections of the department, there was some improvement of the staff position. Two veterinary inspectors, Messrs. R. G. Pearson and J. D. Paterson; a tsetse reclamation officer, Mr. T. W. Chorley ; a veterinary entomologist, Mr. E. T. M. Reid ; a pasture research officer, Mr. J. H. Davies and two laboratory technicans, Messrs. R. W. White and J. A. Aspey, arrived on first appointment. Gaafar Eff. Karrar, Salah Eff. El Din Imbabi and Obeid Eff. Mohd. Ali Akoad were appointed as veterinary officers and Ibrahim Eff. Hassan Osman as assistant superintendent.

Retirements included Mr. C. P. Williams, veterinary inspector and Abdulla Eff. Hassan El Shafie, veterinary assistant who had served for 45 years.

Zein Abdin Eff. Mahmoud and Hassein Eff. Hassan Abbc veterinary officers were promoted to veterinary inspectors.

Decorations were awarded to the following :—

M.B.E. to Mr. J. McKay, Inspector Headquarters, B.E.M. to veterinary assistants, Abdulla Eff. El Tayeb El Arabi and El Rashid Eff. Abdel Nabi.

Distribution of classified technical staff on 30th June 1951 was as follows :—

DESIGNATION	NAME	STATION
Director	W. H. Glanville, 4.N., M.R.C.V.S.	Khartoum
Asst/Director (Adm.)	J. D. M. Jack, M.R.C.V.S.	Khartoum
Senior Veterinary Inspector	I. A. Gillespie, M.R.C.V.S.	El Fasher
,, ,, ,,	A. W. Chalmers, M.R.C.V.S.	El Obeid
,, ,, ,,	P. Durran, M.R.C.V.S.	Malakal
,, ,, ,,	J. K. Thomson, M.R.C.V.S., D.V.S.M.	Wad Medani
,, ,, ,,	P. Z. Mackenzie, M.B.E., M.R.C.V.S.	Wau
Veterinary Inspector	H. B. Luxmoore, B.SC., M.R.C.V.S.	Torit
,, ,,	D. G. Clow, M.R.C.V.S.	Malakal
,, ,,	Ibrahim Mohd. Khalil, Dip. Vet. Sci.	Shendi
,, ,,	M. J. Henigan, M.R.C.V.S.	Kassala
,, ,,	D. J. Stewart, M.R.C.V.S.	Kosti
,, ,,	A. Pollock, M.R.C.V.S.	Yirol
,, ,,	A. W. Polden, M.R.C.V.S.	Fangak
,, ,,	R. G. Pearson, M.R.C.V.S.	El Obeid
,, ,,	J. D. Paterson, M.R.C.V.S., D.V.S.M.	Wad Medani

Designation	Name	Station
Veterinary Inspector	Zein El Abdin Mahmud, Dip. Vet. Sci.	Khartoum
,, ,, ...	Hassein Hassan Abbo, Dip. Vet. Sci.	Nyala
Veterinary Officer	Ahmed Magdoub Abdoun, Dip. Vet. Sci.	Wadi Halfa
,, ,, ...	Ahmed Mohd. Dahab, Dip. Vet. Sci.	Malakal
,, ,, ...	Gaafar Karrar, B. V. Sc. (Cairo)	El Obeid
,, ,, ...	Salah El Din Imbabi, Dip. Vet. Sci. ..	Wad Medani
,, ,, ...	Obeid Mohd. Ali Akoad, Dip Vet. Sci.	Malakal
Inspector, H.Q.s.	J. McKay, M.B.E.	Khartoum
Asst/Superintendent	Ibrahim Hassan Osman	Khartoum
Inspector of Hides	E. Knew, Dip. Leathersellers' Coll. ..	Omdurman
Hides Officer	Fuad Hassan Lutfi	Omdurman

RESEARCH.

Asst/Director (Research) ..	J. T. R. Evans, B.SC., M.R.C.V.S. ..	Khartoum
Veterinary Research Officer ..	F. W. Priestley, M.R.C.V.S. Dip. Bact. (London).	Khartoum
,, ,, ,, ..	El Amin Abdulla El Karib, Dip. Vet. Sci.	Khartoum
,, ,, ,, ..	Mohd. Ali Miheimid, Dip. Vet. Sci. ..	Malakal
Laboratory Technican.	R. W. White, F.I.M.L.T.	Khartoum
,, ,, ...	J. A. Aspey, A.I.M.L.T.	Khartoum
Veterinary Officer	El Nazeer Dafalla, Dip. Vet. Sci ..	Khartoum
,, ,, ...	Saad Mahanna, Dip. Vet. Sci.	Khartoum
Pasture Research Officer ..	M. N. Harrison, B.SC. (Agric.) ..	Khartoum
,, ,, ,, ..	T. H. Davies, B.SC., (Agric.)	Malakal
Tsetse Reclamation Officer ..	T. W. Chorley, M.B.E., F.R.E.S. ..	Torit
Veterinary Entomologist ..	E. T. M. Reid, B.SC.	Torit

There was a slight increase in other technical staff, chiefly in the Hides Section, while the strength of unclassified staff remained more or less the same as in 1949.

SECTION II.

DISEASES OF ANIMALS.

Cattle Plague.

In the Bahr El Ghazal Province the large scale use of goat virus vaccine was continued with very satisfactory results and a further 80,483 cattle were immunised by this method. Losses resulting from inoculation were estimated at about O. 25 per cent. In December lapinised virus vaccine was made available and used on all unweaned calves presented for vaccination. It proved a most useful prophylactic and by June 1951, 30,415 calves had been so vaccinated. The intention is to inoculate these calves with goat virus vaccine within twelve months. Large areas of the province remained free of the disease for many months but sporadic outbreaks occurred at various times in most districts. Over 23,000 cattle were serumised in these outbreaks as a control measure. 2,260 doses of tissue vaccine were used in the annual vaccination of township cattle.

During the first half of 1950 the disease was prevalent in the White Nile area of the Blue Nile Province. Serum was used in the control of outbreaks. During the 1950 rains goat virus vaccine was made available to the area but the response was disappointing and only 10,000 cattle were brought for inoculation. Goat virus vaccine was successfully introducd into the Irrigated Area and 3,800 cattle were inoculated. Had the staff position permitted, a start with goat virus vaccine would have been made in the Fung District but this has been postponed till November 1951. The Fung has remained almost free of the disease due to the extensive use of tissue vaccine and to the fact that very few cattle come into the district from the White Nile area.

Outbreaks occurred throughout the period in Darfur Province where the disease is enzootic. As usual the incidence was greatest during the dry months (March to June) when cattle are concentrated on watering centres. Nowadays the disease is often confined to young animals and usually the death rate is not high. Over 64,000 doses of serum were used in the control of outbreaks. Over 21,000 doses of tissue vaccine were used for the protection of trade cattle. The third season of the large scale immunisation scheme ended in February 1950. 36,000 animals were inoculated with tissue vaccine in January and February. During the 1950/51 season there was a change over from tissue vaccine to goat virus vaccine. During the ten months period September 1950 to June 1951 approximately 150,000 cattle were vaccinated (about 16,500 in Northern and Masalit Districts, 20,000 in Western District and the remaining 104,500 in Southern District). There was a drop of approximately 80,000 in the number of cattle vaccinated compared with the three previous years. Several factors contributed to make the cattle owners chary of the new vaccine. Vague unfounded rumours of losses in Kordofan Province, the severity of the reaction and its similarity to natural cattle plague, and the warnings which had to be given of necessity in regard to pregnant cows, all helped to give the idea that the product was not safe. In addition the mishap in connection with contagious bovine pleuro-pneumonia vaccination of merchants cattle tended to be attributed by popular report to the new vaccine. Deaths on the whole were very few but occasionally all the deaths, although less than 1 percent over all, fell on one owner and so the rumours of danger were exaggerated.

No outbreaks occurred west of the Nile in Equatoria Province where all cattle, excluding Bari, were kept immunised with tissue vaccine. The position on the east bank was not so satisfactory. An outbreak resulting in heavy losses occurred among Lango cattle in Torit District. The disease is endemic in Eastern District and owing to the nomadic nature of the cattle owners, and unusual administrative difficulties, effective control of the disease in this district is bound to be a slow process. Infected cattle from Uganda were responsible for two outbreaks in Eastern District while the origin of a third outbreak was Turkana cattle which crossed the Sudan frontier from Kenya in search of pasture and water. The Nyangatom of Ethiopia trespassed several times into Eastern District in search of grazing and may have been responsible for further outbreaks. A start was made with goat virus vaccination in Torit District in April 1951 but the response from the Latuka cattle owners was disappointingly poor.

With the exception of Gedaref District, Kassala Province remained free of the disease. Serum was used to control the small number of outbreaks that occurred in Gedaref District. About 33,500 doses of tissue vaccine were used for the protection of cattle in the province. Goat virus vaccine was used for the first time and over 5,000 cattle were inoculated along the river Rahad and in Gedaref urban area.

Khartoum Province remained free of the disease throughout the period under review.

The incidence of the disease in Kordofan Province was again low. Approximately 442,000 cattle were inoculated with cattle plague biologicals during the period. About 35,500 doses of serum were used in the control of outbreaks which occurred in all districts but which were most numerous in the Tegale and Jebels Districts. 231,200 doses of tissue vaccine were used for the protection of herds threatened by the disease while 48,800 export cattle and 8,500 local slaughter cattle were protected in this manner. In September a large scale immunisation scheme using goat virus vaccine was started in Dar Messeria of Western Kordofan District. 113,410 Dar Messeria and Dinka cattle were immunised by this method. Results were excellent. Reactions were good and mortality less than O. 5 per cent. Nevertheless several owners suffered relatively high losses through disobeying instructions. There was disinclination on the part of some owners to have their cattle inoculated. This was partly due to reports of losses due to goat virus vaccine being confused with losses due to contagious bovine pleuro-pneumonia vaccine. Plans were prepared for the extension of the goat virus vaccination scheme to other districts of the province.

With the exception of two small localised outbreaks which were promptly suppressed, Northern Province remained free of the disease. Cattle imported from Kordofan were responsible for both outbreaks. The first occurred in June 1950 when 80 cattle in a village north of Debba were involved. Only two deaths occurred. The second outbreak occurred in March 1951 at Tangasi involving three Kordofan cattle which were destroyed as a control measure. The vaccination and branding of all cattle prior to admission to animal markets was continued. 7705 cattle were vaccinated during the period under review. In addition 288 export cattle were protected with tissue vaccine. The introduction of goat virus vaccine in Northern Province for the immunisation of working cattle presented a number of difficulties. The loss of a trained water-wheel bull as a result of vaccination would be a particularly severe loss to an owner whose livelihood depends on his few working cattle. Before launching a large scaled campaign it was considered advisable to conduct a trial on a government pump scheme. 417 ploughing bulls on the Borgeig scheme were vaccinated at a time (December 1950) when it was possible for the cattle to be rested after vaccination. The result of this experimental trial was very satisfactory, there being only one casualty. Subsequently plans were made for vaccination of all cattle on the Dongola Reach during the following May, (May being a dead season for water-wheels) Arrangements were made for vaccination centres and for a steamer fitted with a refrigerator to be made available for the work on May first. Unfortunately the steamer was not available until 19th May by which time many water-wheels had already resumed work. Though the majority of cattle attending the centres had to be sent away without vaccination because they were working and could not be rested, 2703 were inoculated. Only 4 casualties resulted from the vaccination and compensation will be paid to the owners. It is hoped it will be possible to immunise all the remaining cattle on the Merowe/Dongola Reach next season.

No very extensive outbreaks occurred in the Upper Nile Province. The disease was, as usual, most serious in the early rains. In May and June 1950 the Shilluk and certain areas of Western Nuer were most seriously affected. In May and June 1951 the usual increase of disease incidence was noted in all areas and the disease was reported from Bor District for the first time for many months. 42,440 doses of serum and 218,460 doses of tissue vaccine were used in the province to control the disease. Bor District Dinka co-operated well in the vaccination scheme as also did the Shilluk. The Nuer of Eastern Nuer District showed an encouraging increase of confidence but disease control in the district is complicated by the annual dry season migration of large numbers of cattle over the Ethiopian frontier. The response of Central Nuer District tribes was disappointing in 1951 but they were so preoccupied with reinfection by trypanosomiasis that they were apathetic to prophylaxis for other diseases. It is hoped that a start will be made next season with goat virus vaccination in the Upper Nile Province.

Contagious Bovine Pleuro-Pneumonia.

This disease, which had reached epidemic proportions in late 1949 and early 1950 in many areas of the Bahr El Ghazal Province was reduced to negligible proportions by the large scale use of vaccine. During the period under review 333,844 cattle were vaccinated.

There was little change in the incidence of the disease in the Blue Nile Province. Most outbreaks occurred in the White Nile area. The outbreaks in the Irrigated area never assumed serious proportions and there were brief periods of complete freedom. No cases of the disease occurred in the Fung District. 27,000 cattle were vaccinated in the province.

The disease was reported from all districts of Darfur Province and the incidence of the disease has increased. It had been hoped to inoculate all cattle passing through the cattle plague vaccination centres in order to increase the number of immune cattle but the setback in confidence arising out of the deaths in trade cattle following vaccination made this impossible. The Assistant Director (Research) deals with these " accidents " in his report. It was necessary for a time to stop vaccination almost entirely in the province. Confidence has been gradually re-established and increasing numbers were vaccinated both prophylactically and in connection with outbreaks during the period April to June 1951. 64,400 cattle were vaccinated during the period under review.

Despite a few " accidents " resulting from vaccination most cattle owners in Equatoria Province appreciated the efficacy of the vaccine and 62,000 doses of vaccine were used. There was a large decline in the incidence of the disease compared with 1949.

Kassala Province remained free of the disease with the exception of an isolated outbreak at Port Sudan dairy. The outbreak was quickly suppressed by the slaughter of the infected animals.

The incidence of the disease was very low in Khartoum Province. A serious outbreak involving 560 cattle occurred at the Belgravia dairy in Khartoum North. Infected animals were slaughtered and the remainder vaccinated.

An increased incidence of the disease was reported from Kordofan Province. Outbreaks occurred in all districts throughout the period under review. Over 500 deaths were reported as occurring in tribal herds while 2340 infected cattle belonging to merchants were slaughtered at El Obeid. Many other merchants' and arab cattle must have died unreported. The increased incidence of the disease was undoubtedly due to the large numbers of trade cattle which were grazed in the province over long periods. Most outbreaks were traced to trade cattle and the heavily infected areas were those in which trade cattle grazed. An effort was made to eradicate the disease in Tegale District, which became infected by large numbers of export cattle that spent the 1950 summer near Abbassia.

Nearly 10,000 cattle were vaccinated in the area. The casualties caused by swellings following the use of vaccine in trade cattle made certain local cattle owners refuse the vaccine. Their confidence was subsequently regained to a great extent. Over 71,000 cattle were vaccinated in the province during the period under review.

In the winter of 1949/50 this disease was widespread in the Upper Nile Province, particularly in Western and Eastern Nuer Districts. At that time, demand for vaccine could not be met but by March increased supplies were available and 6,000 doses were issued in that month. It was hoped that a steady 10,000 doses could be utilised monthly but with abatement of the disease from May onwards, cattle owners were not enthusiastic for prophylaxis in the absence of obvious threat by disease. It was difficult to stimulate interest in the vaccine as the nilotics are not so alive to the danger of pleuro-pneumonia as they are to cattle plague. Also the period of the efficacy of the vaccine makes administration difficult with the poor communications in the province. 19,350 of vaccine were used in the province.

Bovine Trypanosomiasis.

The Bahr El Ghazal Province had the usual outbreaks of the disease. Some of these were associated with known tsetse fly areas and some with unknown or only suspected areas. In the Twij country, the area of the Jur River District bounded by the Bahr El Arab and Loll rivers, there was a very serious epidemic of the disease which started in 1950 and carried on into 1951. In the early summer of 1951 the epidemic spread westwards to Aweil District. The incidence of this epidemic appeared to be associated with the very heavy rains and subsequent flooding which occurred in the area in the summer of 1951. Searches for tsetse flies by lay staff in areas where cattle were known to have become infected proved fruitless. Over 32,000 cattle were treated between June 1950 and June 1951 out of a total cattle population of approximately 150,000. Almost all treatment was carried out with dimidium bromide with very satisfactory results. A few thousand cattle were treated with antrycide. Altogether 36,434 cattle received treatment with dimidium bromide and 4,670 head with antrycide in the province during the period under review. Two herds of cattle and a number of working bulls used by the Forestry Department for timber extraction were maintained in good health in tsetse fly country in Western District with injections of antrycide pro-salt every 3 months. There was an increase in the trade in slaughter cattle moving on the hoof from the Bahr El Ghazal Province through tsetse fly country to Equatoria Province ; approximately 2,000 cattle treated with antrycide pro-salt, prior to departure, were moved without incurring any losses from trypanosomiasis.

In the Blue Nile Province where the disease is seldom a major problem a few individual cases occurred in Singa and 3 outbreaks were reported from the White Nile area.

In April and May 1950, 190 cattle returning from the south west beyond the Bahr El Arab river in Darfur Province were inspected. Trypanosomes were observed in 89 of them and they were given antrycide. During the 18 months period 444 cattle, all clinical cases and proved positive on microscopic examination, were treated with antrycide in Darfur Province.

On the West bank of the Nile in Equatoria Province very few cases of the disease occurred compared with previous years. For the first time a sufficient number of trained stockmen were available to give prompt treatment with dimidium bromide to any cases that occurred. As far as is known no deaths occurred on the west bank. On the east bank the situation was not so satisfactory and many outbreaks were reported from Torit District.

In Kassala Province one outbreak in a small herd grazing on the Rahad river was reported in March 1951. Infected animals were treated with dimidium bromide.

The disease reappeared early in 1950 in Kordofan Province on the Bahr El Arab river, mainly amongst Dinka cattle but some arab cattle were also infected. In March it was reported that a tsetse fly had been discovered at Kolokot, just inside the Kordofan boundry where it meets that of the Upper Nile and the Bahr El Ghazal Provinces. During the period February to April 1950, 8,000 infected cattle were treated with dimidium bromide or antrycide. 1,400 Fellata cattle on their return to Kordofan Province from the Shilluk District of the Upper Nile Province, where they contracted the disease, were treated during the rains of 1950. 16,000 infected Dinka and Arab cattle were treated in Dar Messeria early n 1951 and a further 4,500 head in June.

Trypanosomiasis continued to be the biggest disease problem of the Upper Nile Province where a recrudescence of the disease occurred. The Assistant Director (Research) deals with the matter in his report.

Camel Trypanosomiasis.

There was an unusually high incidence of the disease resulting from the abnormally heavy rains of 1950. Approximately 85,000 camels were treated with antrypol in Blue Nile, Darfur, Kassala and Kordofan Provinces. Antrycide was used with marked success for the treatment of several hundred camels in Blue Nile and Kassala Provinces, infected with antrypol resistant strains of itrypanosomes.

Trypanosomiasis in other Animals.

Two cases of T. evansi infection were diagnosed in horses in the Irrigated area of the Blue Nile Province. Both were treated with antrycide. The first made an apparent recovery but died after either a relapse or a re-infection. The second recovered. These are the first cases of T. evansi infection of horses in the Sudan. A number of horses were successfully protected with antrycide prosalt in the Bahr El Ghazal and Equatoria Provinces.

A number of cases of T. vivax infection were diagnosed in sheep and goats from the Zeraf Island of the Upper Nile Province.

Antrycide was used for the successful treatment of a T. simiae infection of pigs in Equatoria Province.

Foot and Mouth Disease.

Exceptionally few outbreaks of this disease were reported and no cases were observed in the export quarantine parks. There were a few small outbreaks of little significance in the eastern half of the Bahr El Ghazal Province. A single outbreak was reported early in 1950 on the Rahad river in Kassala Province. The only cases reported from Kordofan Province were among cattle on the Bahr El Arab river in 1950. A small outbreak was confirmed at Malakal in the Upper Nile Province in March 1951.

Veterinary Inspector, Equatoria Province reported the appearance of a condition known as " panting " among Taposa cattle in Eastern District. It is stated to be an after-effect of foot and mouth disease. The coats of affected animals grow to an unusual length and the animals are unable to walk far without distress and therefore spend most of the day panting in any shade they can find. The result is progressive debility and although some cases linger on for even as long as a year or two none ever recovers. The proportion of affected animals appears to be low—probably not more than O. 25 per cent but owing to the necessity of leaving them behind in the villages when the other cattle go out to graze, they are very noticable. The Taposa claim to have seen the condition for the first time two years ago.

Haemorrhagic Septicaemia.

The heavy rains of 1950 may have been responsible for an increased incidence of the disease in some provinces. Upper Nile and Blue Nile Provinces suffered most from the disease and some 16,500 doses of vaccine were used to control the outbreaks in these two provinces.

An outbreak involving 50 pigs, of which 18 died, occurred in Khartoum Province. All pigs, totalling 560, in the neighbourhood of the outbreak were vaccinated as a control measure.

Mange in Camels.

The disease was prevalent in native herds in the camel rearing provinces. Demands for gammatox paste dip were very big and it is estimated that approximately 65,000 camels were treated.

Fascioliasis.

The disease was prevalent in the White Nile area of Blue Nile Province. Teams of departmental staff toured the affected areas and treated infected animals with hexachloroethane. Professor Mozley visited the area twice and advised on snail control. The provision of water supplies in grazing areas away from the river will assist in reducing the incidence of the disease. A few cases of the disease were observed in the Irrigated area and at Sennar among White Nile cattle. A close watch is being kept on cattle in Sennar area and in northern Fung as it is possible that the flood area of the Sennar dam may become infected.

In Darfur Province the disease occurs in cattle at Sunni on Jebel Marra (6000 feet) where there is permanent water and an extensive irrigation system. The head of local administration asked for treatment but nobody else would agree to treatment. 108 cattle were treated with hexachloroethane.

Cryptococcus Infections.

Sixty horses and mules were destroyed suffering from this disease. There was a decrease in the incidence of the disease everywhere except in the Fung District of Blue Nile Province where 41 cases occurred in police mules. The spread of the disease was almost entirely due to neglect—failure to remove ticks daily. The original source of the infection is Ethiopia and the disease is picked up at the tethering grounds and merchants shops.

Rabies.

Reported losses from rabies were 117 compared with 74 in the twelve months of 1949. The following table shows the number and distribution of positive cases :—

Animal	Positive	Negative
Dog	88	
Donkey	13	
Horse	3	
Cat	2	
Calf	3	
Sheep	1	
Goat	4	
Camel	2	
Hyaena	1	
TOTAL	117	260

417 brains were received, of which 40 were decomposed and useless for examination.

The destruction of stray dogs and cats as well as wild carnivora was continued by police, departmental and local administration staff in all affected areas. 204 dogs and 798 cats were destroyed in Khartoum Province and 665 dogs, 61 hyaenas, 661 foxes and 120 jackals were destroyed in Northern Province.

Other Diseases.

The following table shows the distribution of other diseases which received attention during the period :—

Province	Bahr El Ghazal	Blue Nile	Darfur	Equatoria	Kassala	Khartoum	Kordofan	Northern	Upper Nile
	R E C A	R E C A	R E C A	R E C A	R E C A	R E C A	R E C A	R E C A	R E C A
Disease.									
Anthrax	– – – –	P – P –	P P – –	– – – –	P P – –	P – – –	P – – –	– – – –	– – – –
Blackquarter	– – – –	– – – –	P – – –	P – – –	– – – –	– – – –	P – – –	– – – –	– – – –
Tetanus	– – – –	P P – –	– – – –	– – – –	– – – –	– P – –	– – – –	P – – –	– – – –
Contagious Necrosis	– – – –	– – – –	– – P –	– – – –	– – P –	– – – –	– – P –	– – – –	– – – –
Malignant Catarrh	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	P – – –
African Horse Sickness	– – – –	– P – –	– P – –	– – – –	– – – –	– – – –	– P – –	– – – –	– – – –
Ulcerative Cellulitis	– – – –	– – – –	– P – –	– – – –	– – – –	– – – –	– P – –	– – – –	– – – –
Encephalo-Myelitis	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	– P – –	– – – –	– P – –
Tuberculosis	– – – –	– – – –	– – – –	– – – –	– – – –	P – – –	– – – –	– – – –	– – – –
Contagious Abortion	– – – –	– – – –	– – – –	– – – –	– – – –	P – – –	– – – –	– – – –	– – – –
Strangles	– – – –	– – – –	– P – –	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –
Actinomycosis	– – – –	– – – –	– – – –	– – – –	– – – –	P – – –	P – – –	– – – –	– – – –
Caseous Lymphadenitis	– – – –	P – – –	– – – –	– – – –	– – – –	P – – –	– – – –	– – – –	– – – –
Newcastle Disease	– – – –	– – – P	– – – –	– – – –	– – – –	– – – P	– – – P	– – – –	– – – –
Fowl Typhoid	– – – P	– – – –	– – – –	– – – P	– – – –	– – – –	– – – –	– – – –	– – – –
Fowl Pox	– – – –	– – – –	– – – –	– – – –	– – – –	– – – P	– – – –	– – – –	– – – –
Infectious Laryngo-tracheitis	– – – –	– – – –	– – – –	– – – –	– – – –	– – – P	– – – –	– – – –	– – – –
Mange	P – – –	– – – –	– – – –	– – – –	P P – –	– – – –	– – – –	P – – –	P – – –
Ringworm	– – – –	– P – –	– – – –	– – – –	– P – –	– P – –	– P – –	– – – –	– P – –
Piroplasmosis	– – – –	P P – –	– – – –	P – – –	– P – –	P P – –	P – – –	– – – –	P P – –
Coccidiosis	– – – –	– – – –	– – – –	– – – –	– – – –	– – – P	– – – –	– – – –	P – – P
Schistosomiasis	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	P – – –
Various Helminth Diseases	P – – –	P P P –	P – – –	P – – –	P – P –	– P P –	P – – –	P – – –	P – – –

R — Ruminants—Cattle, Sheep or Goats.

E — Equines—Horses, Mules or Donkeys.

C — Camels.

A — Poultry.

P — Presence reported.

TRADE IN LIVESTOCK AND LIVESTOCK PRODUCTS.

EXTERNAL TRADE.

General.

The export trade in livestock and livestock products was interrupted on several occasions by railway strikes, wash-outs, and navigational difficulties on the Shellal Reach, for periods varying from a few days to over a month but which totalled 16 weeks during the period under review. However with the exception of camels there was an increase compared with 1949 in the value of all livestock and livestock products exported. The total value amounted to over £E. 4½ million.

Although Egypt continued to be the chief importer of Sudanese livestock, there was an extension of the export trade to Saudi Arabia mainly in sheep but 370 cattle, 100 goats, 40 donkeys and 25 camels were also exported.

Cattle and Sheep.

48,696 cattle valued at £E. 729,749 were exported. With the exception of the 370 head to Saudi Arabia and 795 to Palestine, all exports went to Egypt. There was a notable increase in the number of young cattle exported to Egypt; approximately 4700 yearlings in the period under review. Port Sudan increased in importance as an export port and approximately 23,000 cattle were exported via the Red Sea compared with approximately 25,000 head via the Nile Valley route.

101,921 sheep valued at £E. 360,508 were exported. 64,627 went to Egypt, 37,153 to Saudi Arabia and 140 to Palestine. Approximately 56,000 head were exported via Port Sudan and 46,000 head via Wadi Halfa.

Camels.

64,508 camels valued at £E. 1,641,431 were estimated to have been exported to Egypt by overland routes.

Hides Skins and Leather.

Hide prices and exports never before reached such a height as they did during the period under review. There was a keen demand from the United Kingdom and other countries in Europe. Prices reached their peak in February, 1951, when green hides from the Omdurman slaughter house were fetching 167 millemes per oke (14.9 pence per lb) and first quality frame dried hides from the veterinary laboratory were sold at Nyala in Darfur Province for 665 millemes per oke (58.6 pence per lb). By the end of March 1951 there was a decline in prices which continued until the end of June. Hide exports totalled 5319 tons valued at £E. 1,124,814. Egypt with 2,583 tons, the United Kingdom 1,535 tons, Sweden 483 tons and Greece 387 tons were the principal importers.

865,775 hides were graded at the export grading depots and of these 209,683 were dry salted hides from the slaughter houses in the Northern Sudan. Of the 656,192 air dried hides only 7.2 per cent were frame dried—the same percentage as in 1949 but there was a marked improvement in the hides from some provinces, particularly the Upper Nile from which over 30,000 frame dried hides (19 percent of all air dried hides) were received at the depots. Percentages of frame dried hides from other provinces were Northern 0, Kordofan 0.6, Kassala and Darfur 3, Bahr El Ghazal 4.5, Blue Nile 8, Equatoria 19 and Khartoum 20. Details of grading of frame dried hides at the depots were 4 percent firsts, 25 percent seconds, 62 percent thirds and 9 percent rejects and of ground dried hides 0.3 percent firsts, 10 percent seconds, 74 percent thirds and 15.7 percent rejects. Darfur Province was the largest producer of hides ; approximately 233,000 being received at the grading depots. Of the 220,000 ground dried hides received from Darfur 84.7 percent were thirds and 15.2 percent rejects. The main fault of Darfur hides is multi-folding which precludes a proper inspection of the hides and favours hide beetle infestation.

Sheep skin exports totalled 1,898 tons valued at £E. 392,837. The United States of America with 992 tons and the United Kingdom with 427 tons continued to be the main buyers of Sudan sheep skins.

Goat skin exports totalled 324 tons valued at £E. 95,589. The United States of America with 159 tons was the largest importer.

Exports of other skins, chiefly snake, crocodile and lizard totalled 55 tons valued at £E. 59,401. Egypt and France were the principal buyers.

Leather exports totalled 154 tons valued at £E. 65,098

The following table summarises the exports of livestock and livestock products from 1946 to 1950 :—

EXPORTS OF LIVESTOCK AND LIVESTOCK PRODUCTS

1946—1950.

YEAR.	Cattle		Camels		Sheep		Hides		Sheep skins		Goat skins		Other skins		Leather		Total
	Number	Value £E.	Number	Value £E.	Number	Value £E.	Tons	Value £E.	Tons	Value £E.	Tons	Value £E.	Tons	Value £E.	Tons	Value £E.	Value £E.
1946	30,314	352,217	46,500	1,055,000	62,744	162,077	800	70,921	857	145,568	117	31,280	37	90,354	194	10,979	2,017,211
1947	19,001	277,538	50,000	1,200,000	36,906	111,922	1,062	115,116	1,125	169,899	175	46,324	24	61,415	120	30,323	2,013,537
1948	21,583	318,158	54,600	1,335,000	36,070	128,318	1,989	271,380	1,235	213,362	145	31,619	10	13,363	149	47,757	2,358,957
1949	33,331	471,039	78,000	1,977,000	52,884	212,346	2,383	373,409	1,366	204,866	224	44,673	7	11,843	92	30,281	3,325,457
1950	32,467	476,796	44,600	1,081,000	66,716	231,352	3,162	586,425	1,310	249,466	211	56,780	17	28,659	85	32,231	2,742,709

INTERNAL TRADE.

Livestock Markets and Slaughtering Figures.

There was an increase in the number of cattle and goats sold in the main markets and a slight decrease in the number of camels and sheep sold. Average prices of all livestock continued to increase and in the cotton producing areas of the Blue Nile and Kordofan Provinces, owing to the high prices of cotton, animal prices increased to very high figures. For example the following are some prices which were given for animals in the Irrigated area of the Blue Nile Province :— Pack camels £E. 40, Riding donkeys £E. 30, Milch cows £E. 20, Cart horses £E. 20, Bulls £E. 10, Sheep 3.500m/ms.

Nyala animal market has greatly increased in importance during recent years and is now the biggest cattle market in the country. During the eighteen month period the number of cattle sold at Nyala and their average prices were as follows :—Bulls 30,294—£E. 6.224 m/ms. Cows 5,115—£E. 4.608 m/ms. Calves 2,885—£E. 2.374m/ms.

355,261 Sheep, 79,880 cattle and 40,238 goats were slaughtered in the ten principal towns of the country. There was a marked increase in meat prices. At the end of 1949 the retail price of mutton in Khartoum was 150 millemes per oke and of beef 70 millemes per oke. At the end of 1950 the price of mutton had increased to 180 millemes per oke and beef to 80 millemes per oke. Prices increased greatly in 1951 and by the end of June the price of mutton was 260 millemes per oke (23.2 pence per lb.) and beef 160 millemes per oke (14.3 pence per lb.)

Slaughtering figures for 1949 and 1950 are as follows for the 10 principal towns :—

	Sheep	Cattle	Goats	Camels	Total
1949	262,683	44,768	26,096	1704	335,251
1950	247,191	49,859	26,890	1629	325,569

Hides and Skins.

The construction of the new central hide grading depot at Omdurman was completed in February 1950. The premises consist of offices, a show room, a large warehouse with a grading verandah, stores and a demonstration building. Detailed records are kept of the number of hides received at the depot, types, grades, defects and origin. This information is of invaluable assistance in formulating schemes of hide improvement in various parts of the country.

The Inspector of Hides and the Hides Officer toured extensively in the provinces demonstrating improved methods of hide production while members of the hides section attended and carried out demonstrations at numerous agricultural shows and tribal gatherings. A booklet " Sudan Cattle Hides " was prepared by the Inspector of Hides, and it and an Arabic version, translated by the Hides

Officer, had a wide circulation. Further courses of training to nilotic tribesmen were given at Malakal and there is no doubt that the standard of production in certain districts of the Upper Nile Province, particularly Bor District, has greatly improved. The establishment of hide auction markets at all court centres in Bor District has also been an incentive to better production. To reduce the extensive damage caused to hides by horn rakes among trade cattle, many thousands of cattle were horn-tipped with dehorning shears at El Obeid, Kosti and Omdurman.

The Inspector of Hides attended the first conference of the International Hide Allied Trades Improvement Society held in Brussels. He also visited Uganda, Kenya and Tanganyika where he gained valuable experience of the administration of hides legislation in these territories. Further progress was made in the drafting of the Hides and Skins Bill and it is hoped that the Bill will be ready for presentation to the Legislative Assembly during the 1951/52 session

Improved slaughter houses were constructed at Singa and Dueim in the Blue Nile Province. Standard slaughter house plans with construction details and estimates of cost were prepared by the Inspector of Hides and forwarded to many town and district councils.

Although Sudan sheep and goat skins have established for themselves a very good reputation in the world's markets, complaints have been received from tanners in the United Kingdom and the United States of America that the keeping properties of the skins are often very poor and that a number of them fall to pieces in the tanneries due to putrefactive damage. The cause of this damage is not known but it is thought that it may be due to delay between flaying and curing or that the salt curing, as carried out in the Sudan, is not sufficiently thorough or that the salt eventually has a weakening effect on the skin fibres. In co-operation with Dr. J. R. Furlong of the Colonial Plant and Animal Products Bureau of the Imperial Institute, the Inspector of Hides carried out a series of experiments employing various methods of drying and salt-curing of sheep and goat skins during the cold and hot seasons. The skins were forwarded to Mr. W. E. Palmer of Whitby Bros., Yeovil and the research work on the raw and tanned skins was carried out by the British Leather Manufacture Research Association at Egham. It is hoped that the results of these tests will provide valuable information.

SECTION IV.

ANIMAL HUSBANDRY AND LIVESTOCK IMPROVEMENT.

The abnormally good rains in the principal livestock raising regions of the northern Sudan during 1950 provided excellent grazing and satisfactory water supplies for the major portion of the period under review. In early 1950 before the rains broke, animals in the Northern Sudan suffered extreme hardship. Cattle suffered most as their water requirements are greatest and their grazing least compared with camels and sheep. It is estimated that some nomads lost one third of their herds from starvation. There was another big migration southwards of northern Kordofan and Darfur nomads and their animals, in some cases as far south as the Bahr El Arab river.

The condition of government animals was good during the period. Wastage from all causes was estimated at 9 percent.

The inauguration of the goat virus vaccination campaign interfered with castration work in Kordofan Province but over 7,000 scrub bulls were castrated in Dar Messeria. Many calves sired by the imported Kenana bulls were produced but it was reported that the incidence of dystokia had increased in cows served by these bulls as the calves were larger.

Dairy herds in the Bahr El Ghazal Province remained in good health and high production records were reported from Tonj and Rumbek primary school herds. Four Aliab stud bulls from Lakes District were transferred to the Wau dairy.

The milk output of the Malakal dairy was more than doubled. Feeding of expensive concentrates in the form of oil cake proved to be quite uneconomic for low producing Nilotic cows and the rations, apart from grazing, now consist of cut grass and native beer grains mixed with a small proportion of ground sorghum and salt. Of cows which calved and completed their lactations during the eighteen months period, the average lactation was 37 weeks and the average yield 1230 lbs. The highest individual daily yield was 21 lbs.

A scheme for the improvement of livestock other than horses was approved by the rural district councils in Northern Province. For the present it is proposed to restrict the scheme to animals on government pump schemes, where adequate supplies of fodder are available. Three donkey stallions and two stud rams were purchased by the department ; two of the donkeys were sent to Shendi and the other to Bouga and and the two rams were sent to Borgeig.

In March 1950 the Darfur Province Council decided that horse shows should in future be bi-annual instead of annual. Two horse shows were scheduled for the 1950/51 season but the outbreaks of cerebro-spinal meningitis in the province lead to the abandonment of one show and restricted the attendance at the other. " Horse fairs " were held at three centres to give horse owners an opportunity of presenting horses for sale. The general condition of the animals at all the centres reflected the plentiful grain supply this season. The Senior Veterinary Inspector, Darfur Province reported that he had never previously seen young animals in such good condition at a show. 557 horses were presented for sale of which 53 were purchased including 4 for use as tribal stallions. To encourage breeders the price of remounts was raised to an average of just over £E. 20 per head.

At the Muglad show in Kordofan Province 28 remounts were purchased for the police at prices ranging from £E. 15-18.

The arab stallion Mozer died in August 1950 at Khartoum. He had covered 16 mares before his death. A country bred horse Faragalla was purchased for use as a government sire in March 1951 and covered 7 mares in Khartoum by the end of June. The two arab stallions Registan and Gawhar stood at Khartoum for varying periods and covered 21 mares between them.

Gawhar covered 61 mares in Northern Province at Shendi and in Berber District while Registan covered 39 mares at Shendi.

SECTION V.

EDUCATION.

The various agricultural shows and tribal gatherings held in most provinces provided an opportunity to extend departmental propaganda in disease control, animal management and the development of the livestock industry.

The training of subordinate staff was continued in all provinces. The necessity for suitably trained subordinate staff capable of taking responsibility without constant supervision increases as the department expands. The need is greatest in areas where communications are difficult over a great part of the year such as in the Upper Nile Province. Plans were approved for the establishment of a veterinary training school at Malakal which will serve the three southern provinces.

SECTION VI.

MISCELLANEOUS.

VETERINARY HOSPITALS AND DISPENSARIES.

In the Blue Nile Province a new dispensary was built at Rufaa and the dispensaries at Dueum and Kurmuk were replaced by larger and better buildings. Funds have been approved for new dispensaries at Jebelein, Keri-Kera and Gulli in the White Nile area and Hosh and Maelig in the Irrigated area.

3543 animals were treated as outpatients at Khartoum hospital where five new loose boxes were constructed. Over 7,000 animals were treated at the various hospitals and dispensaries in Northern Province.

Dispensary stores were built at Raga and Thiet in the Bahr El Ghazal Province.

Revenue and Expenditure.

The following table shows the actual revenue and expenditure of the department for the 18 months period compared with the past two years.

	1948	1949	1950/51. 18 Months Period
	£E.	£E.	£E.
1. Revenue	70,529	73,138	128,575
2. Expenditure			
(i) Personnel and Personal Allowances ..	73,787	78,171	169,198
(ii) Services	67,746	61,846	139,396
(iii) Capital	8,708	3,233	9,320
Total ..	150,241	143,250	317,914
3. Development Budget	4,465	75	1,696

(Signed)
W. H. GLANVILLE
Director, Veterinary Service.

REPORT OF THE ASSISTANT DIRECTOR (RESEARCH)

for the period

1st JANUARY 1950 — 30th JUNE 1951.

A. STAFF.

The establishment of the technical classified staff of the Research Section on June 30th, 1951 was as follows :—

1	Assistant Director (Research).
4	Veterinary Research Officers.
2	Assistant Veterinary Research Officers.
2	Pasture Research Officers.
1	Tsetse Reclamation Officer.
1	Veterinary Entomologist.
1	Livestock Development Officer
2	Laboratory Technicians.
5	Veterinary Assistants.

The following new appointments were made during the period under review :—

Veterinary Entomologist, Mr. E. T. M. Reid, B.Sc. (22.1.50)
Tsetse Reclamation Officer, Mr. T. W. Chorley, M.B.E. (19.1.51)
Pasture Research Officer, Mr. J. H. Davies, B.Sc. (26.9.50)
Laboratory Technician, Mr. R. W. White, F.I.M.L.T. (4.1.50)
Laboratory Technician, Mr. J. A. Aspey (18.12.50).

Mr. Chorley was seconded to the Sudan Veterinary Service from the Colonial Service for a period of three years. Mr. Davies was seconded to the Jonglei Investigation Team for special duties from the date of his appointment.

The posts of one Veterinary Research Officer, two Assistant Veterinary Research Officers and one Livestock Development Officer remained vacant throughout. Two Sudanese Veterinary Officers were, however, attached to the Research Section for the whole of the period and will become eligible for consideration for promotion to Assistant Veterinary Research Officers. One of them, Nazeer Dafalla was granted an Imperial Chemical Industries scholarship for a year's post graduate course at the Liverpool School of Tropical Medicine and at the Faculty of Veterinary Scince, University of Liverpool.

Veterinary Research Officers Mohammed Ali Miheimid and El Amin Abdulla El Karib were, respectively, in charge of the branch laboratories at Malakal and Nyala.

The Pasture Research Officer continued his survey of the grazing areas of the Sudan.

The Tsetse Reclamation Officer and the Veterinary Entomologist were posted to the Southern Provinces to carry out tsetse survey work.

The Assistant Director (Research) continued to hold the additional appointment of Commissioner for Animal Trypanosomiasis Control and in this capacity he was responsible to the Livestock and Veterinary Policy Standing Committee for recommending measures for the control of trypanosomiasis in domestic livestock.

B. BUILDINGS.

A three-room laboratory wing, a two-room store and a two-room small-animal house were built in the Khartoum Laboratory compound. These additions made it possible to increase substantially the issues of biological and other products from the laboratory.

C. ROUTINE WORK.

As usual most of the time of the veterinary professional staff was taken up with routine work. This consisted mainly of the preparation of biological products, the distribution of these and others purchased abroad, the distribution of trypanocidal drugs and the examination of specimens submitted for diagnosis.

The sources of these products and the totals distributed together with comparative figures for 1949, are shown in Table I. The distribution of the products amongst the Provinces are shown in Table II. Brief notes follow on items that merit special comment.

Note :—The figures for 1950-51 cover the period from January 1st 1950 to June 30th 1951.

TABLE I.

Product	Source	Doses distributed	
		1950—51	1949
Cattle Plague Tissue Vaccine	Malakal and Nyala Laboratories	674,880	587,020
Attenuated Goat Virus Vaccine	Kenya	751,512	26,250
Attenuated Lapinised Virus Vaccine	Kenya	52,580	—
Cattle Plague Antiserum	Malakal Lab.	324,960	164,000
C.B.P.P. Vaccine	Khartoum Lab. and Kenya	730,505	112,875
Haemorrhagic Septicaemia Vaccine	Khartoum Lab.	18,635	8,400
Blackquarter Vaccine	Khartoum Lab.	6,240	2,580
Foot and Mouth disease Virus	Khartoum Lab.	0,100	34,140
Horse Sickness Vaccine	South Africa	2,228	1,136
Anthrax Vaccine	Kenya	68,876	43,016
Antrypol	I.C. (P) Ltd.	88,312	31,010
Antrycide Sulphate	I.C. (P) Ltd.	67,220 gms	—
Antrycide pro-salt	I.C. (P) Ltd.	12,215 gms	—
Dimidium Bromide	May and Baker Ltd.	42,100 gms	—

TABLE II.

Province	Northern	Khartoum	Kassala	Blue Nile	Kordofan	Darfur	Upper Nile	Bahr-El Ghazal	Equatoria	Hdqtrs
Cattle Plague Vaccine ...	9,920	4,480	33,500	35,302	279,398	49,720	213,480	11,520	35,960	1,600
Goat Virus Vaccine	5,500	—	11,750	29,750	195,000	225,000	—	264,950	19,250	—
Lapinised Virus Vaccine ...	—	—	—	—	—	—	—	52,330	250	—
Cattle Plague Antiserum ...	—	—	14,400	49,800	49,800	49,800	40,000	30,000	30,060	61,100
C.B.P.P. Vaccine	225	30	75	37,925	99,925	78,550	27,250	416,875	69,500	—
Haem. Sept. Vaccine... ...	120	240	—	6,095	360	—	10,380	1,440	—	—
Blackquarter Vaccine ...	060	—	—	60	4,860	—	—	720	540	—
Foot and Mouth Disease Virus	—	—	—	—	100	—	—	—	—	—
Horse Sickness Vaccine ...	22	256	198	951	276	392	48	68	17	—
Anthrax Vaccine	722	550	3,242	4,716	49,506	9,640	500	—	—	—
Antrypol	—	550	22,602	22,160	29,000	14,000	—	—	—	—
Antrycide Sulphate (gms.) ...	—	—	2,000	1,020	33,000	1,500	23,000	14,500	1,000	200
Antrycide Pro-salt (gms.) ...	—	—	—	—	—	—	175	9,100	2,940	—
Dimidium Bromide (gms.) ...	—	—	200	—	6,800	—	20,000	12,100	3,000	—

1. Cattle Plague Vaccine (inactivated glycerinised lymphoidal tisue)

The issues recorded include the output of two season's operations at the Malakal Laboratory and of one season's operation at the Nyala Laboratory. For the first time all demands for the vaccine were satisfied. They were however substantially lower than during the immediately preceding years on account of the large scale vaccination carried out with attenuated goat virus vaccine.

2. Attenuated Goat Virus Vaccine.

This vaccine purchased from the Veterinary Research Laboratory, Kabete, Kenya gave satisfactory results. Over three quarters of a million doses were issued and the casualties following vaccination were no greater than were expected being only about one per cent.

3. Attenuated Lapinised Virus Vaccine.

This vaccine was also purchased from the Veterinary Research Laboratory, Kabete, and was used for the protection of calves in the Bahr-el-Ghazal Province. The owners were warned that protection following inoculation with this vaccine was not lifelong and that the animals should be brought forward for inoculation with attenuated goat virus a year later.

4. Cattle Plague Antiserum.

The issues recorded include the output of two seasons operations. There continued to be a considerable demand for this product for distribution to cattle rearing areas that are inaccessible for many months during the rainy season. The output was sufficient to supply all requirements.

5. Contagious Bovine Pleuro-Pneumonia Vaccine.

Following the arrival of new technical staff and equipment early in 1950 an attempt was made to increase substantially the production of C.B.P.P. vaccine in order to supply the rapidly increasing demands for it. A successful start was made and during the first six months over two hundred thousand doses were issued ; virtually no swellings were reported to have developed following inoculation. Subsequent issues, however, produced severe reactions following inoculation and several hundred cattle died as a result.

The same strain of organism (Strain F) was used for the production of all this vaccine. It was attenuated by weekly subculture and was first tested for safety at the 43rd generation by inoculating three cattle with it, one with 2 cc subcutaneously, one with 2 cc intramuscularly and one with 2 cc subcutaneously and 2 cc intramuscularly. No swellings appeared at any of the inoculation sites.

Several tubes of two-day cultures of the 46th generation of this strain were freeze-dried in December 1947, stored in a refrigerator and cultures from these were used as seed material for the production of vaccine. Between then and June 1950 some 420,000 doses of vaccine were produced from them and they gave satisfactory results in the field.

In December 1949 one of the tubes of dried culture was subcultured twice and another series of freeze-dried two-day cultures was prepared. It was vaccine prepared from this second series of tubes that produced the severe reactions reported in the field. This unexpected exaltation of virulence following the drying of " safe " cultures was afterwards repeated with a " safe " culture from another strain.

The issue of vaccine from the Khartoum Laboratory was of course immediately suspended until a new strain could be tested and brought into use. In the meantime the country's requirements were purchased from the Veterinary Research Laboratory, Kenya. Altogether 163,000 doses were obtained from there.

Early in 1951 a new strain (Strain 139) was tested at the 45th and 49th generations and found to be safe. It was used for vaccine production from the 50th generation onwards. Although most of the issues of vaccine made from it gave satisfactory results in the field, a few reports stated that the vaccine produced swellings in some groups of inoculated cattle and that many of them subsequently died. On enquiry it was found that these reactions followed the use of a few bottles only from the various batches of vaccine prepared.

The investigation of the cause of these " accidents " has not yet produced definite results. The recent work carried out by Mr. F. W. Priestley on the freeze-drying of the pleuro-pneumonia organism has focussed attention on the possibility of an increase in virulence following the re-inoculation of vaccine previously stored in a refrigerator, such as occurs when the vaccine is transported to out-stations (mean shade temperature about 37°C) Investigation of this possibility is being carried out and in the meantime storage of vaccine in refrigerators has been suspended.

6. Antrycide Sulphate.

Treatment of cattle. The mass treatment of bovine trypanosomiasis with antrycide sulphate in the Upper Nile Province, described in the Annual Report for 1949, was continued and some thirty thousand more cattle were inoculated during the first four months of 1951. It was stated in the 1949 Report that virtually all the cattle in an area of about 25,000 square miles had been inoculated ; this has since been shown to have been inaccurate. Virtually all the cattle that were seen were inoculated but subsequent inspections have shown that many owners had concealed their cattle and that probably only about two thirds of the total number were actually inoculated.

The results of the treatment continued to be very satisfactory for about a year after its application and the incidence of the disease appeared to have been reduced to a negligible proportion. Subsequently, however, during the 1950-51 dry season the disease was found to be widespread again although the incidence was never anything like as high as it was when the mass treatment was started.

It is not possible at present to give definite reasons for this recrudescence of the disease ; it may have been due to one or more of the following causes and they are being investigated :—

(a) Failure of drug therapy to effect complete cures in some cattle.

(b) Impracticability of inoculating a high enough proportion of cattle during the mass treatment campaign.

(c) Existence of hitherto unidentified " islands "of tsetse flies.

(d) Spread of the disease from sheep and goats.

(e) Spread of the disease from game animals.

There is no justification yet for mass re-treatment and in any case this will not be agreed to without giving very full consideration to the possibility of producing drug resistant trypanosomiasis. Cattle are being treated with dimidium bromide when requested by owners, and where this treatment is given an attempt is made to inoculate all the cattle in the herd.

Treatment of Camels. Antrycide Sulphate was issued in two gram doses for the treatment of *Trypanosoma evansi* infection in camels in areas where the trypanosomes were known to have developed resistance to the action of antrypol. About one thousand camels were treated and, as far as could be ascertained, the results were very satisfactory.

7. Antrycide pro-salt.

The drug was used chiefly for the protection of trade cattle moving southwards from the Bahr-el-Ghazal Province to the main tsetse belt. Attempts were made made to ensure that all the cattle were slaughtered within three months of inoculation.

A few small herds in tsetse infested country were protected against trypanosomiasis by inoculation at intervals of three months.

8. Diagnosis of specimens.

A total of 2,975 specimens were submitted by the field staff for examination. The diagnoses made were representative of those made almost every year except that Newcastle disease in fowls, schistosomiasis in cattle and *Trypanosoma evansi* infection in two horses were diagnosed for the first time in the Sudan.

D. RESEARCH.

Experiments on Contagious Bovine Pleuro-pneumonia

(By F. W. Priestley).

1. Diagnosis.

Because the complement fixation test is an impractical means of diagnosis on a large scale in the Sudan, search was made for a simpler method and a slide flocculation test was eventually devised. Briefly the technique consists of mixing on a slide loopfuls of concentrated antigen and of the serum under test and then examining for flocculation through a watchmaker's lens. The details of this test have been published elsewhere.

It was shown that confirmed cases of contagious bovine pleuro-pneumonia react to both flocculation and complement fixation tests and that normal animals react to neither. A total of 1309 sera were subjected to both tests ; 15 were anti-complementary. Of the remainder of 430 positive to the complement fixation test only 13 (3.02 percent) were negative to flocculation ; on the other hand of 546 positive to the flocculation test no fewer than 129 (23.63 percent) failed to fix complement. This discrepancy in favour of flocculation was due to a number of sera from vaccinated animals which react to the flocculation test *before* they fix complement.

It has been noted that loopfuls of serum placed on a slide and allowed to dry retain their flocculating power for at least 12 months even when stored at 37°C ; this means that, if necessary, dried sera from identifiable animals could be sent to a laboratory for diagnosis.

2. The maintenance of cultures by freeze-drying.

A satisfactory freeze-drying technique has at last been evolved. It has been shown that young cultures of the pleuro-pneumonia organism will survive for at least three years when stored in the ice-chest and for at least a year when stored at 37°C.

There is gradually accumulating evidence to show that the drying process causes a sharp increase in virulence, possibly by the selective destruction of the older and less virulent organisms. Thus, for example, a 43rd generation culture when tested for virulence before drying caused no reactions in the three inoculated cattle yet the same strain dried at the 48th generation and subsequently re-isolated and tested killed three of four inoculated cattle. Another caused no reactions in the six inoculated cattle yet when dried at the 51st generation and subsequently tested caused reactions in two and death in one of the three inoculated cattle.

Attempts to produce a dried vaccine have failed. In general if the organisms are resistant enough to survive in the tissues following inoculation they cause swellings and deaths and if they fail to survive in the tissues they produce no immunity. Thus, 12 animals were inoculated with dried vaccine ; 4 developed large swellings and of these 2 died ; of the remaining 8 animals subsequently tested for immunity only 2 survived. In a second experiment 4 animals were inoculated with dried vaccine ; none showed any reaction and when subsequently tested for immunity 3 reacted and 2 died.

3. The bactericidal action of blood.

Briefly the technique for testing the bactericidal action of blood consists of seeding a loopful of culture to 1 c.c. defibrinated blood and making loopful subculture to serum broth at intervals thereafter.

The results obtained to-date are interesting and certainly justify further work. Of 24 normal animals so far examined 18 showed no bactericidal action ; of 15 vaccinated animals 11 showed positive bactericidal action ; 9 infected animals which subsequently survived all showed a positive bactericidal action ; and of 9 infected which subsequently died none showed bactericidal action.

The interesting facts emerge that there is a strict correlation between immunity and the bactericidal action and that immunity bears little or no relation to the flocculating antibody since every one of the infected animals, whether they died or survived, was positive to the flocculation test.

Following vaccination the bactericidal action appears to take about 30 days to develop which roughly coincides with the onset of immunity.

The bactericidal action is almost certainly dependent upon specific antibody and complement since it is developed following vaccination and is abolished by heat at 56°C.

There is, thus, a clear suggestion that immunity is at least related to some labile (and probably) surface antigen. Direct experiments to test this hypothesis are now in progress.

4. Miscellaneous observations.

A modified stevenel blue staining method has been shown to be entirely satisfactory for the routine demonstration of the pleuro-pneumonia organism in culture.

In serum broth the organism dies out after about 50 days at 37°C and after about 150 days in the ice-chest.

Attempts to simplify and improve Bennett's medium have failed. Contrary to his belief it has been shown quite unequivocally that the organism fails to grow in media entirely devoid of serum (or serum proteins). The factor in serum responsible for growth is heat stable and resident in the protein fraction.

The pleuro-pneumonia organism reduces methylene blue but possesses no fibrinolysin or coagulase.

Experiments are now in progress in an endeavour to explain the " accidents " in the field which sometimes follow the inoculation of vaccine previously shown to have been safe. Factors which appear to be excluded are variations in the serum content of the medium and needle contamination from actively infected animals.

E. ENTOMOLOGY.

Mr. E. T. M. Reid took up his appointment as entomologist in January 1950 and was immediately posted to Equatoria Province to organise tsetse survey work there. After a preliminary period spent in training staff he began a transect survey of the main tsetse belt from the border of Yei District with Uganda and the Belgian Congo northwards to the Yirrol-Rumbek road. By the end of the year he had carried out a fairly complete tsetse reconnaissance of this area of about ten thousand square miles.

This work had to be suspended at the beginning of 1951 because of a deterioration in the incidence of bovine trypanosomiasis to the south of the main belt and all entomological staff had to be redeployed to carry out a search for tsetse flies in the cattle rearing areas of Bahr-el-Ghazal and Upper Nile Provinces.

The staff was constituted into a Tsetse Survey and Reclamation team under the direction of Mr. T. W. Chorley, seconded from Uganda by the Colonial Service. A tsetse school was organised to train fly surveyors and fly catchers and preparations are being continued for this new, large task of surveying an area covering about 150,000 square miles.

In August 1950 Mr. Reid attended a short course of instruction arranged by the Chief Entomologist of the East African Tsetse and Trypanosomiasis Research and Reclamation Organisation at Shinyanga, Tanganyika Territory.

F. PASTURE RESEARCH.

The Pasture Research Officer continued his survey of the grazing areas of the Sudan. He completed his field work in Darfur, Kordofan, Upper Nile, Bahr-el-Ghazal and Equatoria Provinces and he should finish his study of the remainder of the country by the end of 1951.

In addition, in Southern Darfur Province he and his assistant fixed sites for the digging of hafirs (earth tanks), for the storage of water, with the object of enabling a greater number of cattle to be kept off the Bahr-el-Arab for a longer period annually so that heavy losses from starvation in bad grazing years may be prevented. This is the first step in a scheme for developing balanced grazing in the Western Sudan.

During 1950 the Pasture Research Officer made an extensive tour of South and East Africa to study some of the developments in tropical grassland husbandry.

G. PUBLICATIONS.

Two papers were published during the period under review :—

Evans, J. T. R. Bovine Trypanosomiasis in the Sudan : Mass Treatment with Antrycide—Veterinary Record 1950, Vol. 62, pp 59-60.

Priestley, F. W. A Slide Flocculation Test for the Diagnosis of Contagious Bovine Pleuro-Pneumonia—Veterinary Record, 1951, Vol. 63, pp 427-429.

J. T. R. EVANS.
Asst/Director (Research).

Khartoum,
11/8/1951.

BUREAU OF [illegible] DISEASES